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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/714,430	11/13/2003	Joseph D. Rigney	041A.0005.U1(US)	1772
29683	7590	05/20/2005	EXAMINER	
HARRINGTON & SMITH, LLP 4 RESEARCH DRIVE SHELTON, CT 06484-6212			TUROCY, DAVID P	
			ART UNIT	PAPER NUMBER
			1762	
DATE MAILED: 05/20/2005				

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/714,430

Applicant(s)

RIGNEY ET AL.

Examiner

David Turocy

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 21 March 2005.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-25 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-25 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date 4/25/05, 4/27/05
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 3/21/2004 has been entered.

Response to Amendment

2. Applicant's amendments, filed 1/6/2005 and 4/25/2005, have been fully considered and reviewed by the examiner. The examiner notes the amendments to independent claims 1, 19, and 25. Claims 1-25 pending.

Response to Arguments

Applicant's arguments with respect to claims 1-25 have been considered but are moot in view of the new ground(s) of rejection.

Claim Rejections - 35 USC § 112

3. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

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4. Claims 1-25 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

5. In claims 1, 19, and 25, the newly added claim limitation "to restore adjacent airfoil to airfoil distance...*without use of excess coating that must be subsequently removed*" [emphasis added] appears to be new matter. The specification does not provide support for such a negative limitation, where reapplying to specific dimensions may include other process steps other than coating. Reapplication of the top ceramic coating to a nominal thickness of $t+\Delta t-\Delta x$ does not require *exact* thickness of the ceramic coating is applied during the coating process. Negative limitations recited to overcome prior art can be considered new matter. *Ex Parte Grasselli et al.* 231 USPQ 393.

Claim Rejections - 35 USC § 103

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

7. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of

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the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

8. Claims 1-5, 9-11, and 13-25 are rejected under 35 U.S.C. 103(a) as being unpatentable over Schaeffer et al. (5,851,409) in view of Arnold (6,049,978).

Schaeffer et al teaches of a method of repairing gas turbine engine part having a damaged thermal barrier coating system thereon, said system comprising a coating on a based metal substrate consisting of a bond coat and a top ceramic barrier coating (TBC), as required by the independent claims (abstract, Column 2). Schaeffer discloses completely removing the thermal barrier system, including removing the ceramic thermal barrier coating along with the metallic bond coat, which is a diffusion coating, which inherently removes a portion of the base metal substrate and subsequently reapplication of a new TBC (abstract, Column 2). When the substrate of the part is made from a nickel superalloy (which is required by Applicant in later claims), Schaeffer teaches the replacement bond coat to be nickel-aluminide beta phase (NiAl) (Column 2).

Schaeffer fails to disclose restoring adjacent airfoil-to-airfoil throat distance to about the distance preceding the engine run using the " $t+\Delta t-\Delta x$ " analysis required by Applicant.

However, Arnold discloses that restoring critical gas flow path area in airfoil components to about their original dimensions is important because the alterations of the dimensions of the airfoil can detrimentally modify airflow and therefore reduce the engines performance (column 1, lines 20-22 and 48-53). Arnold also discloses that the post repair dimensions are equal to the dimension necessary for effectively returning the part to service and turbine engine airfoil parts are manufactured to precise tolerances that determine the airflow characteristics (Column 6, lines 30-34, Column 8, lines 14-17). While, neither Schaeffer nor Arnold explicitly discloses making measurements, such measurements are inherent in restoring the dimensions prior to the engine run. It is the examiners position that removal of a thermal barrier coating system and the reapplication of the system to the "original" dimensions inherently requires the " $t+\Delta t-\Delta x$ " analysis required by Applicant. The thermal barrier system will inherently have a "thickness t " and the removed portion of the base will inherently have a thickness Δt , and it is the examiners position that one of ordinary skill in the art would recognize to return the part to the original dimensions results in reapplication of a new thermal barrier system, including the top ceramic coating and the underlying bond coating with a "thickness $t+\Delta t$ ". Therefore, reapplication of the bond coating to an arbitrary "thickness Δx " must necessarily results in the to apply the top ceramic thermal barrier coating to a nominal thickness of " $t+\Delta t-\Delta x$ ".

Additionally, the examiner cites Arnold as evidence that removing diffusion coating inherently results in the removing a portion of the base metal substrate. Arnold discloses during repair operations of a diffusion coating, a portion of the metal substrate is removed resulting thinning of the metal substrate (Column 2, lines 1-15).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to modify Schaeffer to restore the airfoil to airfoil throat distance to about the distance preceding the engine run, inherently using the " $t+\Delta t-\Delta x$ " analysis, as suggested by Arnold to provide a desirable repair of a turbine airfoil part because Arnold discloses turbine airfoil parts are known in the art to have precise tolerances in their operating dimensions and any deviation from such dimensions is detrimental to the engines operation efficiency.

Schaeffer et al in view of Arnold fails to disclose restoring the dimensions without using excess coating that must be subsequently removed. However Arnold discloses only machining the part to the desired dimensions "if required" (Figure 1b). Arnold reasonably suggests to one of ordinary skill in the art to restore the dimensions without using excess coating and only machine in the event that the desired dimensions are not achieved via the coating process.

Schaeffer et al. in view of Arnold fails to disclose restoring the engine operating efficiency without a weight penalty. However, the prior art and the present claims, reflected by claim 1, teach all the same process steps and thus the results obtained by

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applicants process must necessarily be the same as those obtained by the prior art. Therefore by restoring the airfoil-to-airfoil dimension to the dimensions preceding the engine run to increase the operating efficiency, it must necessarily result in restoring without a weight penalty. Either 1) the applicant and the prior art have different definitions for restoring the part to the proceeding dimensions, or 2) the applicant is using other process steps or parameters that are not shown in the claims.

Claim 2 is addressed above.

Claim 3, it is Examiner's position that weight is interchangeable for thickness in determining amounts of coating applied.

Claims 4 and 14, the thicknesses of the layers would be cause-effective variables, selected by an ordinary artisan depending on the required use of the turbine part or its "class".

It is well settled that determination of optimum values of cause effective variables such as these process parameters is within the skill of one practicing in the art. *In re Boesch*, 205 USPQ 215 (CCPA 1980).

Claims 5, 9-10: Schaeffer teaches diffusion aluminide coatings for the bond coat said diffusion aluminide being taught by Schaeffer to further include reactive elements

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(enabling the metastable phases) and a metal such as Pt, Rh, or Pd (col. 1, lines 25-35).

Claim 11: Schaeffer teaches YSZ as the TBC (col. 4, line 30).

Claims 15-18: It is Examiner's position that the composition and weight percents of the elements of the NiAl beta phase alloy of Schaeffer would have been readily selected by an ordinary artisan in the field to consist of, inherently, Ni and Al, with alloying amounts of zirconium.

Claims 22-24: Schaeffer (Column 3, lines 50-53) in view of Arnold (Column 1, lines 23-37) teaches repair of turbine blades, vanes and foils.

Claims 20-21: Schaeffer teaches the same beta phase NiAl alloy and YSZ TBC; it is Examiner's position that the densities must necessarily be same.

Claim 25, not discussed above, Arnold (abstract) teaches inspection of the component in order to aid in restoring dimensions. Schaeffer (col. 5, line 38) teaches stripping of the TBC system to remove it for repair.

9. Claims 6 and 12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Schaeffer in view of Arnold as applied to claims 1-6 and 9-25 above, and further in view of Darolia et al. (6,461,746).

Schaeffer and Arnold teach that which is disclosed above, but fail to specifically teach that the diffusion aluminide coating is simple or modified and comprises MCrAlY.

However, Darolia et al, teaching of a nickel based superalloy comprising a thermal barrier system including a top ceramic coating and a beta phase NiAl bond coating, discloses the bond coating may alternatively comprise MCrAlY, simple diffusion nickel aluminide or platinum modified diffusion aluminide (Column 5, lines 55-60).

Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to modify Schaeffer in view of Arnold to use a MCrAlY, simple, or modified diffusion aluminide bond coating because Darolia discloses that a MCrAlY, simple, or modified diffusion aluminide bond coating are known substitutes of a beta phase NiAl coating with the reasonable expectation of similar results.

10. Claims 7-8 are rejected under 35 U.S.C. 103(a) as being unpatentable over Schaeffer in view of Arnold as applied to claims 1-6 and 9-25 above, and further in view of Jackson (6,575,702).

Schaeffer and Arnold teach that which is disclosed above, but fail to specifically teach that the nickel-based superalloy is single crystal or directionally solidified.

Jackson teaches that nickel-based superalloys for use in turbine engine components may be made of single crystal-type or directionally solidified-type material.

Since Schaeffer and Arnold teaches a nickel-based superalloy and Jackson teaches the specifics of such an alloy, Jackson would have reasonably suggested one or the other type for use in the method of Schaeffer and Arnold with the expectation of successful results in similar operations.


Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to David Turocy whose telephone number is (571) 272-2940. The examiner can normally be reached on Monday-Friday 8:30-6:00, No 2nd Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Timothy Meeks can be reached on (571) 272-1423. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

David Turocy
AU 1762


TIMOTHY MEEKS
SUPERVISORY PATENT EXAMINER